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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,416	09/08/2003	Naoto Tsuji	ASMJP.134AUS	9025

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EXAMINER	
VESPERMAN, WILLIAM C	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AR

Office Action Summary	Application No.	Applicant(s)	
	10/657,416	TSUJI ET AL.	
	Examiner	Art Unit	
	William C. Vesperman	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1,8 and 9* is/are rejected.

7)☐ Claim(s) *2-7 and 10-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/8/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to applicant's election of December 10, 2004.

Election/Restrictions

2. The examiner wishes to acknowledge the applicant's election of Claims 1 – 12 without traverse.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 8 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Jang et al. (US 6,599,847).

In regards to Claims 1 and 9, Jang et al. teaches (Figure 1 - 3, columns 9, 10, lines 20 - 65) a method for forming an interlayer insulation film for multilayer interconnect of a semiconductor integrated circuit, comprising the steps of: forming a first insulation film (26) on a substrate by plasma CVD using a first source gas comprising a silicon-containing hydrocarbon gas (TEOS); and continuously forming a second insulation (28) film on the first insulation film at a thickness less than the first

insulation film in situ by plasma CVD using a second source gas comprising a silicon-containing hydrocarbon gas and an oxidizing gas (TEOS and an oxidant flow gas) and subjecting the second insulation film (28) to polishing (planarization) for forming a subsequent layer thereon.

In regards to Claim 8, Jang et al. teaches (column 9, lines 51 –65) ozone as an oxidant.

Allowable Subject Matter

4. Claims 2 – 7 and 10 - 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter.

The prior art does not teach or suggest in combination with the other claimed limitations, that the first insulation has a hardness of less than 6 GPa and the second insulation film has a hardness of no less than 6 Gpa; wherein the first source gas further comprises an oxidizing gas having a flow rate which is less than 1.0 times that of the silicon containing hydrocarbon gas; wherein the oxidizing gas in the second source gas has a flow rate which is more than 1.0 times that of the silicon containing hydrocarbon gas; wherein the silicon-containing hydrocarbon in the second source gas has the formula SiaOa-1R2a-b+2(OCnH2n+l)b, where a is an integer of 1 - 3, b is an integer of 0 - 2, n is an integer of 1 - 3, and R is C1-6 hydrocarbon attached to the Si; wherein the

silicon containing hydrocarbon is dimethyl-dimethoxysilane; ;wherein the first source gas further comprises no oxidizing gas; wherein the second insulation film is composed of multiple layers having different oxygen contents; and forming via holes and/or trenches in the first and second insulation films, and filling the holes and/or trenches with copper for interconnect, wherein the polishing conducted thereafter is a chemical mechanical polishing (CMP).

Conclusion

6. Pangrle et al. (US 6,713,382) teaches a vapor treatment for repairing damage of low-k dielectrics.

Li (US 6,602,779) teaches a method for forming low dielectric constant damascene structures.

Chen et al. (US 6,706,637) teaches a dual damascene aperature formation method.

Bolteux et al. (US 6,762,127) teaches an etch process for dielectric materials.

Yosahitaka et al. (US 6,764,939) teaches a semiconductor device and method of making.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Vesperman whose telephone number is 571-272-1701. The examiner can normally be reached on Mon. - Fri., 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Art Unit 2813

February 18, 2005

CRAIG A. THOMPSON
PRIMARY EXAMINER